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ABSTRACT

Some prospects for development of computer-assisted language instruction in six language skill areas (grammar, communication, reading, listening, speaking, and writing) are presented. In grammar instruction, a current challenge is to improve judging of student answers, and "intelligent" computer programs that try to identify the student's misconception (leading to production of a wrong answer) hold promise. Three potential aids for developing intelligent grammar programs include answer-judging algorithms, authoring systems capable of identifying errors, and programming languages designed for natural language processing. Communicative programming, which emphasizes group work, focuses on gaming and simulation as instructional techniques. Reading instruction by computer tries to address individual differences in speed and vocabulary, and many programs are currently available. Listening lessons by computer are the ones most frequently inquired about, and they combine computer interaction with spoken language via audiotapes. Some programs currently allow practice of students' speaking skills by either playing back a student's voice recording or plotting stress and intonation contours on a computer screen for comparison with a recorded voice's contours. A few programs are also available for writing instruction, using such techniques as incorporating student responses into prewritten texts, having students arrange sentences, or using text processing for teaching writing and revision. A list of available programs and their sources are appended. (MSE)

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PROSPECTS IN COMPUTER ASSISTED LANGUAGE LESSONS

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The purpose of this paper is to examine the beginnings of the branch of CALL within the area of second language instruction, specifically in English as a second language. ESL CALL lessons which are intended to help students practice language skills are described in terms of today's realities and tomorrow's prospects in six areas: grammar, communication, reading, listening, pronunciation and writing. Teachers and administrators need to understand the state of the art if they are to make informed decisions regarding probable and possible future directions.

INTRODUCTION

Computer Assisted Language Learning (CALL) represents possibilities for a new path in the field of second language instruction. Considering all of the ways people learn a second language, this path will of course be narrow, situated among a variety of approaches to language study. Yet

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the technique of computerized language instruction has lately received a great deal of attention. It is new and relatively unknown, and there is excitement about the potential it may hold.

Educators interested in CALL are standing at the start of a new methodology. Developers of computer assisted language materials are trying to identify and combine the elements of instruction which are best suited for this medium. Some have designed lessons that students use and like to work with to practice language, but on the whole, the path leads to development of CALL lessons is still relatively untrodden.

The purpose of this paper is to examine the beginnings of the branch of CALL within the area of second language instruction, specifically in English as a second language. ESL CALL lessons intended to help students practice language skills will be described in terms of six areas: grammar, communication, reading, listening, pronunciation, and writing. The description of each area will begin with a statement of recent developments in CALL, followed by some ideas about the prospects ahead. Teachers and administrators need to understand the state of the art now if they are to make informed decisions regarding probable and possible uses of computer instruction in the future.

GRAMMAR

Traditionally, when people spoke of CALL in ESL, they were talking about grammar lessons. Of course, traditionally, when people spoke of ESL, they were talking about the teaching of English grammar; therefore, it seems quite natural to begin the discussion of today and tomorrow with grammar.

From a historical perspective, Computer Assisted Instruction began in the 1960's during the time when theories of Structural Linguistics and Behaviorist Psychology were giving way to those of Transformational Grammar and Cognitive Psychology, and this change was affecting ESL pedagogy. CALL grammar lessons were originally developed with this dichotomy in mind: it was said that computerized grammar drills were useful for ESL instruction to give students out-of-class practice with the more mechanical aspects of language so that in-class time could be spent on more meaningful learning activities. Thus lessons were developed that attended to language forms and attempted to reinforce positive language behaviors and remediate negative ones.

The content of these grammar lessons often focused upon verb tense, use of articles or prepositions, or question or clause formation. In terms of Paulston and Bruder's (1974) classification, the exercises were mainly mechanical; few were meaningful, and fewer still were communicative. There were many lessons, for instance, where a student is presented with sentences in which a part of speech, such as a verb, is left out. Given the simple form of an appropriate verb, the student must change it to the correct form and type it in the blank. In this drill and practice type of lesson, the computer judges whether or not the student's answer is correct. If it is not correct, the student is given a helpful message and told to try again. If it is correct, the next item is presented.

Variations on this basic drill type have also been developed. There are lessons in which the student is evaluated periodically while working through the lesson so that the computer can determine whether the student is to continue along the same path in the lesson, be given some remediation, or be moved ahead because he already knows the material. This kind of lesson is called a tutorial, mainly because different students can take different paths through the same lesson. In other words, its presentation is branched as opposed to the linear format of a drill and practice.

Generally speaking, these approaches represent the beginning stages of CALL. However, it is important to note that they also exemplify the kind of lessons that have been successfully used with ESL students for the past 15 years. Nevertheless, recently these lessons have come up against criticism by supporters of a totally communicative approach to language teaching. These educators see the computer as a useful tool for language study only insofar as it can be used to provide the student with practice in communicative aspects of language. Before discussing the prospects for computerized materials that focus on communication, however, developments and improvements in more traditional grammar lessons should be pointed out.

A relevant criticism of today's grammar lessons is the inadequacy in judging student answers. That is, the program often does not do an analysis on the student's answer that is sufficient for the computer to give the student relevant feedback messages when errors are made (Hart, 1981). For example, in many grammar lessons if a student makes a spelling mistake or a morphological error, the computer will judge his answer as incorrect as if he had typed complete nonsense.

Prospects in grammar lessons lie along the path toward solving this problem. Many developers are working toward

what they call "intelligent" programs -- "intelligent" because the program tries to identify the student's misconception that led to his production of a wrong answer, rather than simply judging it right or wrong. There are three important ingredients that are going into today's and tomorrow's intelligent grammar lessons. First, the use of answer judging algorithms allows the computer to identify particular incorrect answers that a student makes (Chapelle and Jamieson, 1983). Second, the use of authoring systems (e.g., SuperPILOT and EnBASIC) with built-in answer judging algorithms make the computer capable of identifying errors such as word order and spelling mistakes. Third, the use of programming languages such as LISP which are designed for natural language processing give the computer the capability to do an analysis at the sentence level (Loritz, 1984). These prospects will give the designer of ESL grammar lessons more flexibility to be able to present the student with a variety of intelligent grammar lessons.

COMMUNICATIVE

An attempt to produce a more intelligent kind of lesson, though in a different direction than that just described, is the integrative, or communicative, approach. Integrative use of language means the use of a combination of L2 skills with the focus of an activity on the function of language as opposed to its form. Advocates of the communicative approach are often in direct conflict with developers of the more traditional drill and practice grammar lessons. For example, in his book Mindstorms, Papert(1980:3203) addresses this issue: "There is a tendency for this first usable, but still primitive, product of a new technology to dig itself in...with the computer we are in the process of digging ourselves into an anachronism by preserving practices that have no rational basis beyond their historical roots in an earlier period of technical and theoretical development. The use of computers for drill and practice is one example of this phenomenon." Papert's statements represent the strong form of the position taken by advocates of communicative CALL. This view as well as others are included in the integrative category.

Today, an integrative or communicative approach can be described in several ways, yet one similarity is that group work as opposed to individual is encouraged. First, there are CALL versions of language games such as hangman, anagrams, crossword puzzles, tic-tac-toe, concentration, and 20 questions. In order to maintain a gaming atmosphere, scores (often based on speed and accuracy) are kept so that students can play against one another.

Another kind of communicative lesson is a simulation.

In one kind of simulation, the student and computer carry on a "written conversation" in a role play. For example, the student is a patient and the computer plays the role of a doctor. The computer asks the student, "How are you feeling today? The student responds, "Not so well. I hurt my shoulder playing tennis." This simulation works by having the computer program search the student's answer for a key word such as "shoulder" and then it asks a question using that key word, such as "How long has your shoulder bothered you?" If no match is found, the computer responds with something like "Tell me more."

A second kind of simulation is one in which the computer acts as an expert, and the student tries to solve a problem by interacting with the computer. Higgins and Johns (1984) describe several of these simulations, one of which is a lesson called "Photofit" in which the computer draws the face of a burglar and then erases it. The student has to try to reconstruct the face, and the "expert" computer will tell the student what is right or wrong.

A third kind of simulation is an exploration where, for example, a student goes on an adventure, let's say to a city, and has to choose from some options where in the city to go, how to get there, what to say, etc. This kind of simulation has recently been making use of videotape and videodisc by interfacing, or adding, these features to the computer as described by Schneider and Bennion (1983).

Apart from these lessons, perhaps the most dramatic dimension of the integrative approach uses the computer's capacity to receive instructions from a student instead of telling the student what to do. Papert (1980:5) writes: "In many schools today computer aided instruction means making the computer teach the child. In my vision, the child programs the computer. My image does not go beyond: it goes in the opposite direction." For children and adults alike, this has meant focusing on programming -- specifically, writing instructions to the computer as the content of the course. In general, for non-native speaking adults this has meant learning BASIC and learning how to use applications software such as data base management programs. An example of this can be found at the International Institute of Computer Uses at the University of Illinois.

As Canale and Barker (1984) report, children are learning to interact with the computer using LOGO. For example, a child using LOGO types instructions to the computer telling it to plot something on the screen. The computer then draws what the child has told it to. Thus, the child has dynamic interaction with the computer in which the computer does not tell the child what to do, but instead the child tells the computer what to do. This integrative approach, whether it be

games, simulations, or programming, has proven to be an exciting dimension in CALL today.

Although the use of the computer to give students practice in communication does hold great potential, that potential is more of a promise than a reality. One of the problems with communicative ESL lessons today is their lack of availability. Lessons of this type are very expensive to produce in terms of time and, in the case of the videodisc, hardware. However, by far the most serious problem is the quality of the interaction that goes on between computer and student as the student works with a communicative lesson. For example, in a program in which the ESL student is expected to ask the computer questions, it is apparently assumed that the student already knows how to form grammatical questions, because if a question is not in the correct grammatical form, the computer will respond with "I don't understand" and then wait for the student to pose the question grammatically. This level of interaction falls short of real communication, especially when the way ESL students communicate is taken into account.

The availability and expense of these lessons are not likely to pose serious problems in the future. As developers gain familiarity with this approach for ESL, which was popularized by demonstration programs produced by the British Council, more funding for and development of these lessons will be seen. The use of videodisc technology in language instruction has already and will continue to create much excitement in communicative ESL lessons. They will enable the computer to teach aspects of American culture and functional language in a dynamic way. Yet, as far as computer recognition of student input that comes near native speaker ability to recognize meaning from a variety of grammatically acceptable or deviant forms, we still have a long path ahead of us. Promise lies in the area of Artificial Intelligence, in which researchers seek means for making computers "understand" natural language. (Winston, 1977).

With respect to the use of computer games, and use of the computer as a content area of study, much promise clearly lies within our reach. Students in the United States and abroad are becoming accustomed to spending their time playing video games. It is up to the imagination and creativity of developers to produce ESL games that will capture their attention and help them to practice their language skills. This practice may come from the actual content of the game as well as from discussion with human opponents as students sit in pairs at terminals.

When we consider the possibilities for teaching ESL adults computer literacy skills, it is clear that we have barely scratched the surface. As the use of applications programs

becomes more wide-spread each day, foreign students, who will return to their countries to occupy executive positions, are extremely motivated to learn to use computer technology for their businesses. An introduction to applications programs gives the student practice in interacting with a computer program that is far more meaningful than any program that ESL teachers could devise.

READING

Returning to a more traditional approach, the third area to discuss is reading. The large number of reading lessons might reflect one of the strengths of CALL which is individualization. ESL teachers know that students read at different speeds, that they know and don't know different words, and that even though students are placed in the same class, they read at different levels of difficulty. CALL reading lessons typically try to address these kinds of student differences.

In many reading lessons, a student reads a passage and then answers comprehension questions, questions about the main idea, restatement, or for example, in a lesson by Kenner and Brennan (1984) a student has to fill in an outline of a passage not only by having read it, but also by asking the computer questions about the reading and inferring information from the passage. In reading comprehension lessons, typically the student controls the amount of time the text stays on the screen. Many lessons include a dictionary so that a student can ask for a definition of an unfamiliar vocabulary item. Another feature is that some lessons offer levels of difficulty for each passage.

There are also reading series for beginners in the area of language arts which contain exercises on letter recognition, alphabetizing, matching words and pictures, understanding vocabulary in context, identifying pronouns and their referents, and forming new words with roots and affixes. Some lessons teach speed reading, and still another kind of reading lesson is in the format of cloze passages. In these, every nth word is deleted and the student has to fill in the blanks. In some cloze lessons, either the student or the teacher can determine how many blanks there will be, or what kinds of words will be deleted (such as prepositions). Typically, another feature of these cloze passage-type lessons is that teachers can type in their own passages for their students to use. Overall, the area of reading has the greatest quantity of ESL CALL lessons today.

Perhaps because there are so many lessons dealing with reading skills, it is easy to point out their shortcomings. Many of the lessons have problems similar to the ones noted

for other kinds of lessons. That is, they fall short in the area of student-computer interaction; they don't process the answers to open-ended questions intelligently. Many reading lessons present much text on the screen, making it hard on the student's eyes to work at the terminal for a long period of time. The presentation of a great deal of text also decreases the amount of interaction the student has with the computer. Lessons in which this is the case, called "page-turners," have been denounced for years by leaders in instructional computing (Bork, 1981).

Prospects for reading lessons look toward creative lesson designers to produce materials that fall within the guidelines of instructional design and take advantage of computer technology. For example, there are already many lessons that successfully allow the student to practice vocabulary, speed reading, and other reading skills described. In addition, reading lessons will continue to be an area in which teachers can routinely be a part of the material development process. Particularly in the use of cloze passages, teachers are able to type the relevant text into the computer. The program, developed by another person, can then delete every nth word and correct student responses. A program that allows a teacher to do this is called a template system. A template system can be defined as a program that allows the teacher to enter some content material into the computer without actually writing a computer program. By allowing the teacher to "create" and adapt materials for students as they progress through the semester, the computer can become a more integral part of classroom instruction or can be used to provide special ESP materials for students with special subject-area needs.

LISTENING

While reading lessons are probably the most plentiful, it is listening lessons that are most frequently asked about. Perhaps because ESL teachers are accustomed to sending students to a language lab for practice with their oral/aural skills, it is easy to envision the computer used in a similar way. Beyond traditional language lab use, teachers are imagining numerous exciting, individual listening activities for students using the computer.

Today, there are not many ESL students throughout the country who are using the computer to help them with listening skills. However, there are some listening lessons available on the larger mainframe and minicomputer systems as well as on some micros. Students using these lessons have access to spoken language usually via headphones. Prerecorded messages are stored on a cassette tape or disc. Typically, a student can listen to an utterance as many times as desired by touching

the screen or pressing a key.

In some lessons, students hear the directions. In other lessons, the student not only reads the message on the screen, but also hears it. In these two examples though, listening is an adjunct, but not the focus of the lesson.

In the ESL listening lessons at the University of Illinois, a student hears an utterance and types it. A lesson might require the student to type one word or an entire sentence. For example, the student could hear "morning--John reads the newspaper in the morning. Type morning." In another lesson, the student has to type the entire sentence. These are two examples of dictation-type lessons.

Still another approach is used by Computer Curriculum Corporation in their listening comprehension strand which has four formats. At first, a student listens to a passage and then answers multiple choice questions. In the second format, the student reads the questions before and while listening to the passage, and then answers those questions. In the third and fourth formats, the student hears small chunks and then answers true-false questions. These are a few of the ways listening is being practiced in today's ESL lessons.

Unfortunately, today there are only a few listening lessons because of the computer's need for peripheral, or extra, equipment in order to make them work. On a large system such as PLATO, the audio device is used almost exclusively at the University of Illinois U-C campus because of its size, expense, and maintenance needs. The Computer Curriculum Corporation stores digitized sound successfully on their mini-computer. On a common microcomputer, capturing true representations of extended segments of sound is a problem because of the computer's size. Educators generally agree that today's affordable digitized sound stored on microcomputers is not high enough quality to be used by foreign students learning English.

However, before this path of exploration is abandoned, it is necessary to stop and remember that 15 years ago, computers themselves were out of the reach of most schools. Just as technology has brought microcomputers to all of the people, so will it bring affordable sound to all microcomputers.

When quality sound is more widely available, there will be many people working toward finding creative ways of using it in ESL. We may see lessons in which students can practice the listening skills that they need for the TOEFL, such as the 3rd voice dialogs. Students might also be given a situation to listen to in which they must identify social and cultural cues from the language spoken. Note-taking exercises using an academically oriented mini-lecture might also be used to

help the college-bound student. Here again, the teacher might provide lectures on different topics for different students.

All of these listening activities would be particularly useful because of the great variance in students' abilities to understand spoken English. It would indeed be ideal to let students work on these skills individually.

SPEAKING

Of course, it would be useful to have the students not only listen to the computer, but also to have the computer listen to the students. That is, it would be desirable to have a program that would "understand" a student's spoken input. If the program could understand, it might then be able to respond in an intelligent way, thus resulting in a computer-student conversation. As we patiently await the day when students will be conversing with computers, there are people who are working on lessons that will allow them to practice some speaking skills.

One example is found in the listening lessons described in the last section. After correctly typing in sentences they have heard, students can record their voices and then play back the model and their own voices in order to compare them much as they do in a listening lab.

Other possibilities were recently demonstrated by Esling (1984) and Loritz (1984). In their lessons, a student presses a key on the computer and hears a short phrase. As the utterance is heard, its stress and intonation contours are plotted graphically on the bottom half of the screen. The student then repeats the utterance, and in seconds the stress and intonation contours of what s/he has said are plotted on the top half of the screen, so that the student can compare his/her pattern to the model's. These are examples of CALL applications for the computer's capability to process suprasegmental information, which promises to be very interesting.

It should be noted in the second example that the responsibility of comparing the graph of the student's utterance to that of the model was completely in the hands of the student. Even though the computer was able to do an analysis of sorts on the student's utterance, the depth of that analysis was sufficient only to display the intonation contour on the screen. It did not judge it as to its degree of correctness, nor did it "understand" what the student said.

This lack of understanding of student input is a fact of life even today in 1984 -- a disappointing fact indeed considering the number of years that we have seen humans conversing freely with computers in the movies and on TV. In the real

world, today, there are some devices that can recognize a set of isolated words when spoken by a person who has "tuned" the computer to his voice. These devices are a first step down a long path to recognition of spoken utterances.

This path, moreover, is full of pitfalls that trip researchers along the way. There are problems at every level of speech recognition. At the pragmatic, semantic, and syntactic levels, problems are the same as for machine recognition of free text. Those problems are complicated by the difficulty the computer has recognizing sentence and word boundries in the spoken stream. Even at the phonemic level, the computer has a great deal of difficulty teasing out all of the variation that occurs when different native speakers use phonemes in various word positions.

With the current state of technology in this area as it is, it is difficult to identify the prospects for computerized lessons that allow the student to practice speaking skills. The year 1985 may bring some hardware and software for speech recognition that will be of interest to ESL teachers.

WRITING

The final area to be discussed is writing. Like listening and pronunciation, teachers imagine writing lessons that are currently beyond the bounds of technical capabilities. ESL teachers know that students have difficulty writing grammatical sentences, let alone unified paragraphs, well developed compositions, or cohesive research papers. Today, CALL lessons for each of these areas are beginning to be seen.

One kind of writing lesson for children asks questions and then incorporates the child's answers in the context of a story. For beginning writers, there are transformation-type lessons where, for example, a student is shown a paragraph and is required to change the pronouns from singular to plural or masculine to feminine, or to change tense from present to past. Also, beyond the sentence level, Woodruff et al. (1981) describe how students can be given help in using transitions to introduce ideas.

Addressing the writing process, Burns (1980) describes a prewriting lesson that asks a student questions about the topic in order to get the student thinking about what to write on. Other lessons give practice with writing skills by having the student identify a topic sentence or the method of organization of a paragraph. Some lessons require students to arrange sentences in logical order. Still other lessons address the research paper with explanations and exercises on

footnotes and bibliography.

As for the actual writing and revision process, computers are being used for text processing. Students use the computer to type letters and compositions. They edit these online and then print them out on paper. One example of a system that goes beyond simple text processing is Writer's Workbench that was developed by Bell Labs and is being used in a pilot project with ESL students at Colorado State University. With this program, a student types in a composition and the computer checks it for misspellings, counts the number of words in each sentence, and tells the student what percentage of sentences are simple, compound, and complex, for instance. Reid et al. (1983) reported that ESL students can be taught to use the computer system and that they liked it. Moreover, it was felt that the program encouraged ESL students to edit and revise their written work.

Although these writing techniques have been used successfully to help students with sentence writing, revision, and organizational skills, the use of computers to help with writing is limited by the inability of computer programs to understand free expression. Even the work that is being done in the area of grammatical analysis at the sentence level, falls short of being useful for analysis of students' compositions in terms of evaluating style, appropriateness, and other qualities that go beyond simple grammar (Lawlor, 1982).

Prospects in writing lessons in the near future lie in the area of pre-writing and other skill building exercises. In addition, as teachers begin to think creatively about the use of the computer as a writer's tool there are prospects for using its many word-processing capabilities. Most people who have discovered the joy of word-processing say that it has changed the way they write and think. Perhaps this change might be a change for the better for ESL students who inevitably end up doing numerous revisions on each paper they write.

Beyond the use of the computer as a word processor or for specific writing exercises, in no area is there a greater need for the results of the research in Artificial Intelligence. For in order for the computer to be able to correct a composition in an intelligent manner, it must first be able to create some meaning representation of what the student is saying. Winston (1977) describes some work in which people have constructed programs that form primitive meaning representations in a limited context. It is necessary to continue to pay attention to this research in order to see what the future has in store for software that evaluates writing.

CONCLUSION

To summarize, this paper has presented some of the prospects for CALL development in six language skill areas: grammar, communication, reading, listening, speaking, and writing. For each of these aspects, it was pointed out that there has been some groundwork laid by pioneers in the field. Yet, in every area, it is also clear that some problems remain; there are paths that have not yet been discovered. Right now, in 1984, there is a need for teachers to envision themselves as explorers in this new field because there is clearly much work to be done; and even for those teachers who don't aspire to be authors, there is a vast need for education, particularly teacher education because the state of the art is rapidly changing.

To help make it easier to get started using CALL in the classroom, we have provided a list of programs in ESL and Bilingual Education (see Appendix) that are currently available.

APPENDIX

CATESOL, 1984

PROSPECTS IN COMPUTER ASSISTED LANGUAGE LESSONS

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Publishers/Vendors in ESL and Bilingual Education[1]

Publisher/Vendor	Address	Skill[2]						Comments[3]
		G	I	R	L	P	W	
Addison-Wesley	World Language Div. Reading, MA 01867			x				Grades 3-6
Bilingual Education Services	P. O. Box 669 1607 Hope St. South Pasadena, CA 91030-0669	x	x	x				
BIPACS	33 W. Walnut Long Beach, NY 11561	x		x	x			
Borg Warner Educational Systems	600 W. University Dr. Arlington Heights, IL 60004			x				Elementary & high school
The British Council	C.I.L.T. 20 Carlton House Ter London, England SWIY 5AP		x	x				Only Demo lessons available as of 3/84
Center for Educational Experimentation, Development and Evaluation	College of Education University of Iowa 218 Lindquist Center Iowa City, IA 52242	x	x	x				Includes Bilingual Lao, Vietnamese
Comaldor	P. O. Box 36, Stat. O Toronto, Ontario M4A 2N9 Canada			x				
Computer Curriculum Corporation	P. O. Box 10080 Palo Alto, CA 94303	x		x	x	x	x	Mini-computer system only
Control Data Corp.	P. O. Box 261127 San Diego, CA 92126	x		x	x	x		
Dorsett Educational	P. O. Box 1226 Goldsby Airport Norman, OK 73070	x	x	x				

Publisher/Vendor	Address	Skill[2]						Comments[3]
		G	I	R	L	P	W	
EDAC	DISD Box 103 370 Ross Ave Dallas, TX 75204	x						
Educational Activities	1937 Grand Ave. Baldwin, NY 11510	x		x				
Educational Software Consultants	P. O. Box 39846 Orlando, FL 32862			x			x	Elementary
Evaluation Dissemination and Assessment Center	3700 Ross Ave. Dallas, TX 75204	x		x				Grades 6-12; social studies
Gessler Publishing Company	900 Broadway New York, NY 10003			x				
Hartley Courseware	P. O. Box 431 Dimondale, MI 48821	x		x	x			Language Arts
Holt, Rinehart and Winston	383 Madison Ave. New York, NY 10017		x	x				Cloze passage; teacher text
I/CT Instructional/ Communication Technology	10 Stepar Place Huntington Sta. NY 11746			x				
University of Illinois	707 S. Mathews #2004, Urbana, IL 61801	x		x	x		x	on PLATO computer only
Microphys Programs	2048 Ford St. Brooklyn, NY 11229			x				High School
Milliken	1100 Research Blvd. St. Louis, MO 63132			x				Elementary
National Texbtook Co.	4255 W. Toohy Lincolnwood, IL 60646			x				Elementary vocabulary
Nebraska ETV Network	P. O. Box 8311 Lincoln, NE 68501			x				Videodisc
Program Design	11 Idar Ct. Greenwich, CT 06830			x				

Publisher/Vendor	Address	Skill[2]						Comments[3]
		G	I	R	L	P	W	
Regents/ALA	2 Park Avenue New York, NY 10016	x		x				
School House Software	290 Brighton Rd. Elk Grove, IL 60007	x		x				
Sliwa Enterprises	P. O. Box 400 Big Flats, NY 14814			x				
Texas Corp.	7805 S.W., Suite 124 Miami, FL 33155	x				x		

[1]Two primary sources were used for this compilation: Microcomputers in Bilingual and Foreign Language Instruction: A Guide and a Bibliography. 1983. National Center for Bilingual Research. 4665 Lampson Ave., Los Alamitos, CA 90720 (213 598-0481; and Vanloves Educators Handbook and Software Directory. 1982. Vital Information, Inc., Overland Park, KS 66204 (913) 381-1818.

[2]Key to abbreviations:

G = grammar
I = integrative, games, simulation
R = reading, vocabulary, spelling
L = listening
P = pronunciation
W = writing

[3]Level is adult or N/S unless otherwise specified. The bilingual lessons generally designate Spanish as the intended native language.

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